

ASSEMBLAGE-LEVEL BIOLOGICAL INDICATORS FOR DETERMINING IMPAIRMENT/NON-IMPAIRMENT STATUS OF MISSISSIPPI STREAMS

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Biographical Sketch of Authors

James Stribling is an aquatic ecologist and Associate Director at Tetra Tech, Inc. He has worked for approximately 15 years in the field of pollution ecology, and specializes in monitoring program design, ecological data QA/QC, and application of assessment results to water resource management decisionmaking. Matt Hicks is an aquatic ecologist with the Mississippi DEQ Water Quality Assessment Branch, and is the agency technical lead on and overall Project Manager for their IBI project. He is an aquatic entomologist by training, and has worked for over three years to help elevate QA/QC expectations of the agency, and to establish the use of biological indicators for making natural resource management and regulatory decisions. Dave Bressler is an aquatic ecologist at Tetra Tech, Inc., and has worked for approximately three years on projects developing biological indicators. In particular, he has been involved in designing studies, performing fieldwork, managing data entry and QC, and performing statistical analyses of data quality and overall ecological assessments of streams and watersheds. He is the technical lead on the Mississippi Department of Environmental Quality (DEQ) project developing and calibrating a statewide benthic index of biological integrity.

Abstract

Similar to many other states, Mississippi is charged by legal authority to determine the impairment status of its waterbodies, in particular, to evaluate the validity of prior decisions to place nearly 700 on its Clean Water Act §303(d) list. The state decided that, because the aquatic biota integrates the effects of both short- and long-term stressors, it would use biological indicators to establish quantitative impairment/non-impairment decision thresholds. Following revision of all aspects of its field, laboratory, and analytical procedures, a comprehensive quality assurance project plan (QAPP) was written which specifies project data and measurement quality objectives, overall program goals, organizational responsibilities, and intended uses of the data and results. Sites selected for sampling included the wadeable streams listed as impaired on the Year 2000 303(d) list, as well as other wadeable streams selected as candidate reference sites. From January-March 2001, a total of 475 streams (approx. 70% listed as impaired and 30% candidate reference) were sampled for benthic macroinvertebrates, physical habitat quality, substrate particle size distribution, 17 selected field and laboratory chemistry analytes; GPS-based coordinates, photographs, and quantitative drainage area and land use characteristics were obtained for each location. Analysis included development of a site classification framework; definition of quantitative reference site thresholds for each site class; selection, testing, and calibration of biological measures; combination to a geographically calibrated biological index; and development of narrative site assessments. This paper will describe the overall sampling design, sample processing and data analytical procedures, structure of the biological index, resulting site assessments, overall QA/QC activities and data, and resulting recommendations for site listing and de-listing.